

Foamed Boron Preservative

A Wood Treatment Alternative

San Francisco Maritime National Historical Park manages a collection of seven historic ships, more than 100 small craft and thousands of maritime artifacts. This collection includes numerous wooden industrial artifacts that were exposed to decay fungus or insects during their long years of service. Ongoing decay of historic artifacts can be difficult to treat utilizing conventional methods. This is especially true of structures such as ships, which often incorporate numerous voids within their design. We have undertaken testing and initial application of foamed boron preservatives to specifically treat these spaces. These treatments appear highly successful, providing for the first time, treatment of these vulnerable areas.

Past preservation treatments, mostly using chemicals in petroleum-based oil and grease carriers were of limited effectiveness. Many were highly toxic and presented significant health and environmental risks. Most often these preservatives were applied topically and there was little migration of preservative beyond the surface. These preservatives were fairly effective in small-dimensioned lumber but not in large timbers, because significant portions of the wood were untreated and remained vulnerable to decay.

Roller, brush, and spray application of borate preservative is effective when the wood to be treated is accessible. Treatment of the hold of C.A. Thayer was accomplished in less than four hours. The area was accessible for public use the following day. Photo by Tim Campbell.



Since 1985, we have incorporated a variety of boron based wood preservatives into our Integrated Pest Management Program to treat wood decay and insect infestation within our collection.

Boron is a ubiquitous element, present in fresh water, sea water, the soil, and all plants. Water soluble boron preservatives or borates, are effective against a broad spectrum of wood destroying organisms. Borates are highly toxic to wood decay fungi yet low in toxicity to mammals and fish. Borate applications can also effectively control subterranean termites, Formosan termites, drywood termites, carpenter ants, and many wood-boring beetles. Borate preservatives do not break down or otherwise become ineffective over time; however, borate treated wood can lose effectiveness due to leaching by water. Care must be taken to protect treated wood from the weather.

Because they are clear, borates do not interfere with the visual appearance of wood surfaces. This is an important consideration when treating historic objects or structures.

High wood moisture content contributes to an environment that promotes the decay of wooden ships. We are now using that high moisture environment to our advantage, and gaining the most thorough preservative treatment to date. Borates are most commonly applied to wood surfaces and allowed to diffuse deep into the wood. Diffusion is enhanced by high wood moisture content. Borate diffusion can be improved by treating and then covering treated material with plastic sheeting to slow the drying process.

Treatment of large wooden components of historic ships has presented particularly difficult challenges to the preservation staff of the park. Foremost among these challenges has been the difficulty in effectively treating internal structural components of vessels. Much like the cavities in a wood stud wall, portions of a ship's wooden hull are difficult to access and treat with preservatives. While limited access can be provided, sprays,

mists, and powdered formulations are often unable to reach many of the vessels most vulnerable components. To achieve complete treatment, we have recently incorporated high volume water-based foam generators into our treatment arsenal. These machines permit us to direct preservative rich foam into hull cavities, coating surfaces completely and providing the protection they require.

The use of foam machines permits effective borate application throughout the vessels while creating only minimal inconvenience. Our initial large scale treatment of the steam schooner *Wapama* in 1988-89 utilized a complex system of fixed pipes and spray nozzles which, although effective in the areas treated, was highly intrusive and limited public enjoyment of the vessel. Portions of the vessel, including those not reached by the spray, remain untreated.

Foamed borate has a number of distinct advantages over standard liquid treatments. Foam adheres well to the surfaces it contacts. It can fill voids entirely and may be pumped or poured into spaces where it often remains undisturbed for many days. This encourages high levels of initial absorption and in components with high moisture content can permit diffusion to begin immediately. Repeat application can provide sufficient boron for protection of even the largest timbers.

Commercial foaming equipment is available for use with borate products, and is very effective for residential-sized structures. Our requirements for large ships were far greater. We needed equipment that could generate several thousand gallons of foamed preservative quickly and efficiently. We investigated foam-generating equipment utilized by other industries and evaluated several designed for use by fire departments to quickly produce dense blankets of foam. These proved highly successful. The equipment we selected can produce 15,000 gallons of foam using 250 gallons of 15 percent borate solution in about 20 minutes. Pre-mixed borate solution is pumped to the foam generator where a foaming agent is injected and foam produced. We can quickly fill internal voids with thick, preservative rich foam that flows into every space.

In addition to foamed borate application we continue to utilize a 10-15 percent solution for application by spray, brush, roller or dipping. We also use low volume mists, fused boron rods, and powder applications. Much has been learned during the years since 1985, and our experience with boron treatments has proven to us that this preservative can provide an increased level of protection of the wooden vessels and artifacts in our care.

David Casebolt is a museum specialist (conservation) at San Francisco Maritime National Historic Park, CA.

Michael Laws

The Aiken-Rhett House

Historic Charleston Foundation Looks at its Past and Sees its Future

The docent began her tour by saying, "At Drayton Hall, they haven't added anything to the building. Here at the Aiken-Rhett House, we haven't taken anything away." And it's true. Throughout the Aiken-Rhett House, along with peeling paint and exposed plaster lathe, the visitor clearly sees the efforts to update and add comfort for the residents. For example, in the kitchen area, the oil lamp still hangs from the ceiling, the gas line runs next to

it. The early 20th-century knob and tube wiring is stretched over the gas line, and the old gaslight is now electric. It is all still there, frozen in a time capsule that spans one-and-a-half centuries and countless lives.

When acquired by the Charleston Museum in 1975, the Aiken-Rhett House posed a unique problem. Other historic properties in Charleston, South Carolina were restored to a particular period and told a specific story. What era and historic depiction should be represented by this